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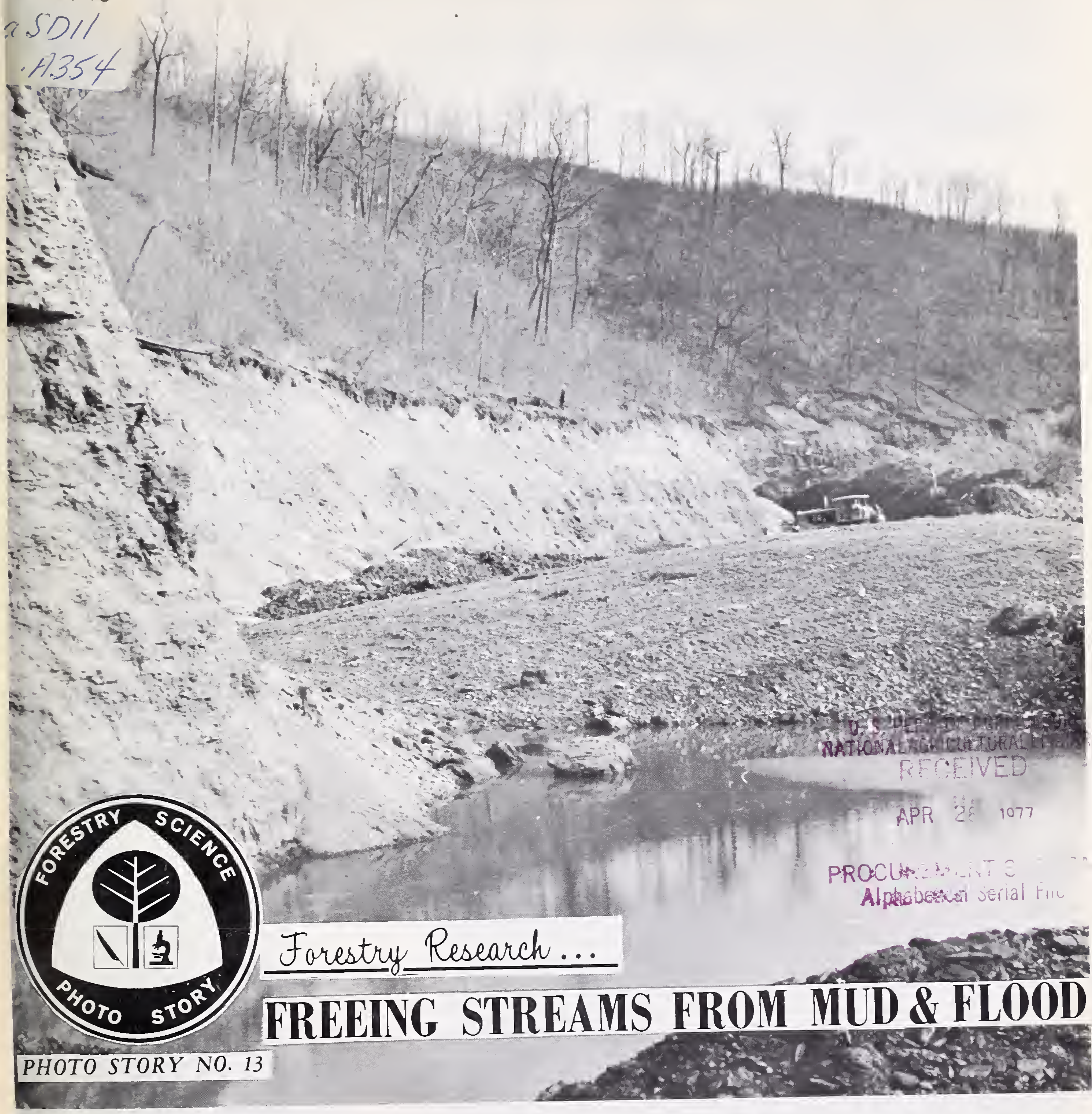

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FORESTRY SCIENCE PHOTO STORY

Forestry Research . . .

FREEING STREAMS FROM MUD & FLOOD

PHOTO STORY NO. 13

The first six months after completion of strip mining on steep terrain are critical to the quality of both the land and the water resources nearby. Every effort must be made to assure stability and prevent erosion of the spoil banks.

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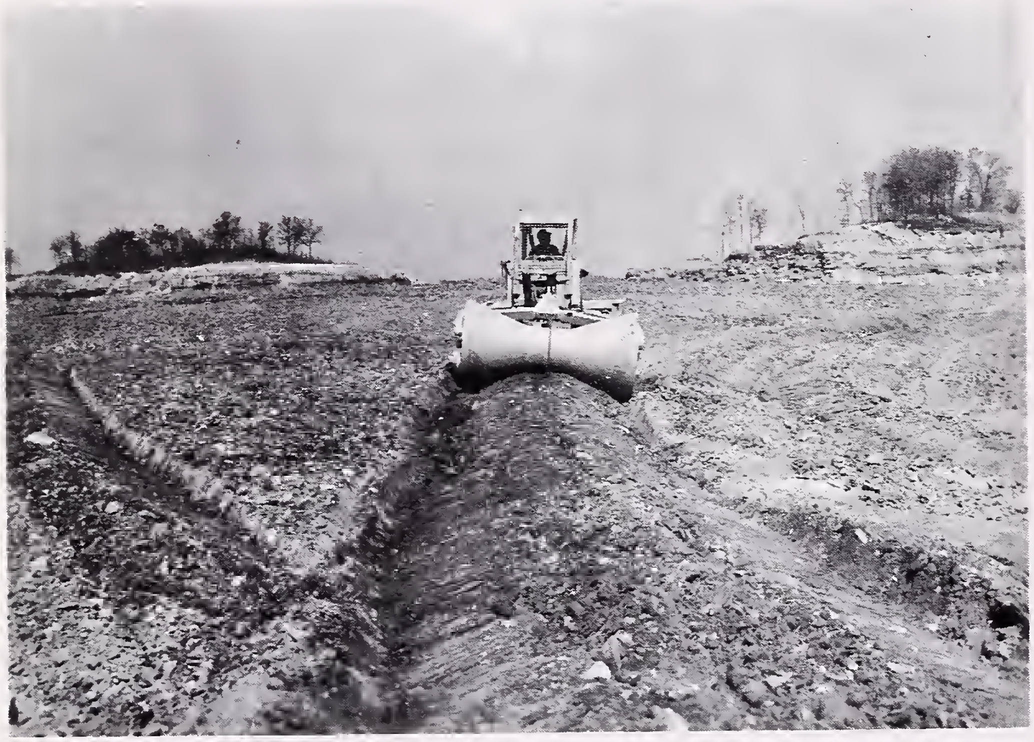
NORTHEASTERN FOREST EXPERIMENT STATION • UPPER DARBY, PENNSYLVANIA 19082

NATIONAL FOREST SYSTEM · COOPERATIVE FORESTRY · FORESTRY RESEARCH

Forest Service personnel are currently testing a terracing system, designed to help stabilize the spoil immediately after mining. With the system, furrows are carved along the sloping bench with a special plow or an angled dozer blade.



Specially constructed plow used to form terraces along the contour on strip-mine benches.

The resulting pattern of furrows resembles a farmer's newly planted field in exaggerated proportions.

Terraces help stabilize banks because they are able to catch and hold rainwater in various amounts depending upon the size of the terraces. The onslaught of pelting rains may be modified sufficiently to permit more water to infiltrate the land surface. This means two things: more water is available for plant establishment and growth and less water is available to rush downslope, thus preventing the dislodging of soil particles that can clog the streams with silt.

Over the past year, Hydrologist Willie R. Curtis, with the Forest Service's Berea, Ky., Watershed Research Project, tallied a total of 70 rainstorms.

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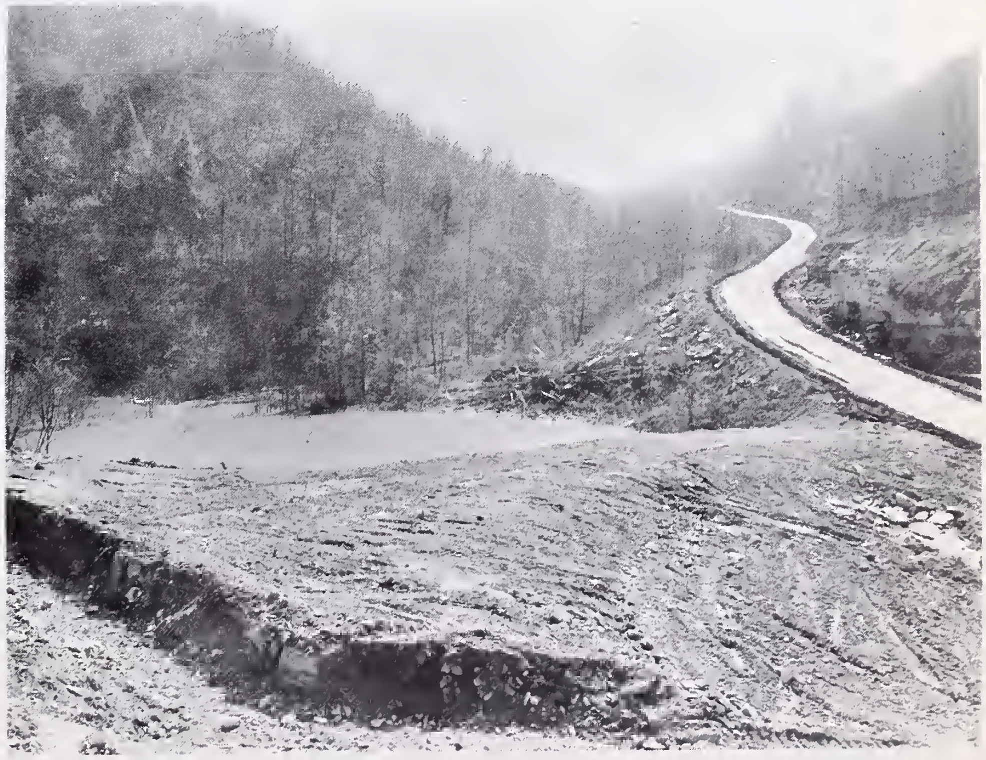
Using the principle of holding water on strip-mine benches and regulating its release, Forest Service researchers are also testing sediment basins. These basins trap water in shallow depressions on coal-mine benches close to where it falls. The water in the basins will either gradually evaporate or soak slowly into the spoil to provide moisture for plant establishment nearby. In either case, silt is left on the bench rather than carried into streams by surface runoff. These basins may also be beneficial in reducing storm runoff peaks while at the same time allowing groundwater recharge which may sustain streamflow through dry periods.

* * *

Although it is most desirable to keep the water close to where it falls, Forest Service scientists envision another means for protecting the quality of the water resource even after it leaves the mine site -- via valley impoundments called settling basins.

In laboratory studies, scientists noted that as much as 95 percent of the strip-mine sediment in a bottle of water will settle to the bottom if left undisturbed for an hour. They reasoned that if flowing water could be quieted for a similar length of time, much of the silt would settle out in the same manner.



Silt is caught in this settling basin in a valley below a strip-mine operation.

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A pair of umes u th automatic recorders to measure unoff nd sediment loss from terraced a adjac nt unterraced plots.

On the basis of th rainstorm information, Curtis advises that terres be designed and used to withstand the numerous storms of varying intensities that can be excted to occur during the first year, when the eah is bare, as well as into the second year, wn vegetation is struggling to gain hold.

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Sediment asin constructed where a ridge used to l.

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Settling basins were constructed in the valleys of three experimental watersheds. Incorporated into the dam construction was an overflow outlet of pipe leading throughtthe dam and an emergency spillway to carry larger flows safely around the dam.

Monitoring the basins, scientists noted that a large part of the silt carried by the stream settled out in the quiet water, and the water that continued to flow out of the stream was therefore much cleaner.

The effectiveness of settling basins is being determined through periodic measurements of silt accumulation.

Such studies by Forest Service researchers often result in practices that mine operators can utilize to protect and restore the environmental quality of the land and water during and after surface mining.